```
=> file jpo

FILE 'JPO' ENTERED AT 16:14:17 ON 31 JUL 1998

  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
  *                         G P I                                   *
  *     J A P A N E S E   P A T E N T   A B S T R A C T S           *
  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *


=> s 13

          1360 DESTRUCTIVE
         13230 DISTIL?
             2 DESTRUCTIVE DISTIL?
                 (DESTRUCTIVE(W)DISTIL?)
         18734 TIRE#
         15228 MICROWAVE
         97515 IRRADIAT?
         85961 RADIAT?
L7           0 L1 AND L2

=> s 14

          1360 DESTRUCTIVE
         13230 DISTIL?
             2 DESTRUCTIVE DISTIL?
                 (DESTRUCTIVE(W)DISTIL?)
         18734 TIRE#
         15419 PREHEAT?
L8           0 L1 AND PREHEAT?

=> file uspto

FILE 'USPAT' ENTERED AT 16:14:35 ON 31 JUL 1998

  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
  *                W E L C O M E   T O   T H E                      *
  *          U. S.   P A T E N T   T E X T   F I L E                *
  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

FILE 'USOCR' ENTERED AT 16:14:35 ON 31 JUL 1998
```

```
Trying 01182...Open

PLEASE ENTER HOST PORT ID:
PLEASE ENTER HOST PORT ID:x
LOGINID:d133vrm
PASSWORD:
LOGINID/PASSWORD REJECTED

The loginid and/or password sent to STN were invalid.
You either typed them incorrectly, or line noise may
have corrupted them.

Do you wish to retry the logon?
Enter choice (y/N):
Do you wish to use the same loginid and password?
Enter choice (y/N):
Enter new loginid (or press [Enter] for d133vrm):
Enter new password:
□d133vrm
LOGINID:
PASSWORD:
TERMINAL (ENTER 1, 2, 3, 4, OR ?):□3

  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
  *                                                               *
  *             Welcome to MESSENGER (APS Text) at USPTO          *
  *                                                               *
  *                                                               *
  *    The USPTO production files are current through:            *
  *    JULY 28 1998 for U.S. Patent Text Data.                    *
  *    JULY 28 1998 for U.S. Current Classification data.         *
  *    JULY 28 1998 for U.S. Patent Image Data.                   *
  *                                                               *
  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
  *        * PLEASE USE 305-9000 FOR NEW TELEPHONE NUMBER *       *
  *                                                               *
  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
  * More U.S. patent data is now available on APS.  The new       *
  * USOCR file contains patents issued in 1970, plus some         *
  * patents that were missing from the USPAT file.  See the       *
  * Patents News Folder under the Public Folders in e-mail for    *
  * more information on using the new file.  Thank you.           *
  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
  *  DISCLAIMER:                                                  *
  *  Neither the United States Government, nor any agency         *
  *  thereof, nor any of their contractors, subcontractors or     *
  *  employees make any warranty, expressed or implied,           *
  *  including any warranty of marketability of fitness for a     *
  *  particular purpose; nor assumes any legal liability or       *
  *  responsibility for any party's use, or the results of        *
  *  such, of the data.                                           *
  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
  *                  Help Desk --> 703-305-9000                   *
  *                                                               *
  *    The Help Desk is staffed for APS support 7 days/week.      *
  *      Monday through Friday:      6:30am - 9:00pm              *
  *      Saturday, Sunday, Holidays: 8:30am - 5:00 pm             *
  *                                                               *
```

```
Trying 01083...Open

PLEASE ENTER HOST PORT ID:
PLEASE ENTER HOST PORT ID:x
LOGINID:d133vrm
PASSWORD:
LOGINID/PASSWORD REJECTED

The loginid and/or password sent to STN were invalid.
You either typed them incorrectly, or line noise may
have corrupted them.

Do you wish to retry the logon?
Enter choice (y/N):
Do you wish to use the same loginid and password?
Enter choice (y/N):
Enter new loginid (or press [Enter] for d133vrm):
Enter new password:
□d133vrm
LOGINID:
PASSWORD:
TERMINAL (ENTER 1, 2, 3, 4, OR ?):□3

 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
 *                                                              *
 *          Welcome to MESSENGER (APS Text) at USPTO            *
 *                                                              *
 *                                                              *
 *    The USPTO production files are current through:           *
 *    JULY 28 1998 for U.S. Patent Text Data.                   *
 *    JULY 28 1998 for U.S. Current Classification data.        *
 *    JULY 28 1998 for U.S. Patent Image Data.                  *
 *                                                              *
 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
 *       * PLEASE USE 305-9000 FOR NEW TELEPHONE NUMBER *       *
 *                                                              *
 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
 * More U.S. patent data is now available on APS.  The new      *
 * USOCR file contains patents issued in 1970, plus some        *
 * patents that were missing from the USPAT file.  See the      *
 * Patents News Folder under the Public Folders in e-mail for   *
 * more information on using the new file.  Thank you.          *
 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
 *  DISCLAIMER:                                                 *
 *  Neither the United States Government, nor any agency        *
 *  thereof, nor any of their contractors, subcontractors or    *
 *  employees make any warranty, expressed or implied,          *
 *  including any warranty of marketability of fitness for a    *
 *  particular purpose; nor assumes any legal liability or      *
 *  responsibility for any party's use, or the results of       *
 *  such, of the data.                                          *
 * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
 *                 Help Desk --> 703-305-9000                   *
 *                                                              *
 *    The Help Desk is staffed for APS support 7 days/week.     *
 *      Monday through Friday:      6:30am - 9:00pm             *
 *      Saturday, Sunday, Holidays: 8:30am - 5:00 pm            *
 *                                                              *
```

likewise in the same converter system and processed into various usable and reusable forms. While being carried by a conveyor through a controlled atmosphere treatment chamber, virtually free from combustion supporting air or other oxidizing agents, the feed material is caused to progressively thermally break down into its more basic constituents which flow out of the material treatment chamber in a continuous liquid and gaseous vapor stream. Negative pressure is applied upstream from the material treatment chamber to lead the liquid and gaseous vapor stream through successive processing stages of collection containers, condensers and gas scrubbers. The variable negative pressure is sufficient to maintain the pressure in the material treatment chamber within a range of slightly above ambient pressure. Decomposed matter entrained in and constituted by the liquid gaseous, and vapor stream is continuously recovered for use and reuse while being cycled through the converter system.

12. 4,038,152, Jul. 26, 1977, Process and apparatus for the **destructive distillation** of waste material; Lyle D. Atkins, 201/2.5; 34/178, 216, 650; 48/111, 209; 196/98; 201/25, 27, 28, 29, 30, 44; 202/117, 128, 138; 208/102 [IMAGE AVAILABLE]

US PAT NO: 4,038,152 [IMAGE AVAILABLE] L3: 12 of 13

ABSTRACT:
An apparatus is provided for the **destructive distillation** of organic waste materials. An insulated sealed distillator compartment is provided having a plurality of conveyor stages for transporting the waste material through the sealed compartment while subjecting the material to a plurality of increased zones of temperature in order to completely pyrolyze the material and evolve pyrolysis gases. An auger feed apparatus supplys a continuous supply of material to the sealed distillator, while an auger discharge apparatus removes a continuous supply of solid carbonaceous residue from the distillator. The residue can be classified and separated into usable products. The evolved gases may be converted into crude oil and natural gas. A process for **destructive distillation** of the waste materials is also disclosed.

13. 3,945,890, Mar. 23, 1976, Converter system; Klaus M. Kemp, 202/84; 48/111; 201/2.5, 14, 25, 27, 32; 202/117; 423/DIG.18 [IMAGE AVAILABLE]

US PAT NO: 3,945,890 [IMAGE AVAILABLE] L3: 13 of 13

ABSTRACT:
Organic and pseudo-organic materials, such as waste materials, for example, are processed in a converter system and decomposed into various usable and reusable forms. Inorganic metals and salts are treated likewise in the same converter system and processed into various usable and reusable forms. While being carried by a conveyor through a controlled atmosphere treatment chamber, virtually free from combustion supporting air or other oxidizing agents, the feed material is caused to progressively thermally break down into its more basic constituents which flow out of the material treatment chamber in a continuous liquid and gaseous vapor stream. Negative pressure is applied upstream from the material treatment chamber to lead the liquid and gaseous vapor stream through successive processing stages of collection containers, condensers and gas scrubbers. The variable negative pressure is sufficient to maintain the pressure in the material treatment chamber within a range of slightly above ambient pressure. Decomposed matter entrained in and constituted by the liquid and gaseous vapor stream is continuously recovered for use and reuse while being cycled through the converter system.

=> s l1 and preheat?

```
        54076 PREHEAT?
L4         17 L1 AND PREHEAT?
```

=> d 14 cit 1-17 ab

1. 5,783,046, Jul. 21, 1998, Process and apparatus for the **destructive distillation** of rubber; Virgil J. Flanigan, 201/25, 4, 13, 15, 35; 202/87 [IMAGE AVAILABLE]

US PAT NO: 5,783,046 [IMAGE AVAILABLE] L4: 1 of 17

ABSTRACT:
An improved process and apparatus for the **destructive distillation** or pyrolysis of rubber, such as used rubber **tires**, to produce liquid and gaseous hydrocarbons and a solid carbonaceous char. A heat transfer gas circulating in a circulation loop is used to cool the hot char produced in the distillation chamber of a distillation oven, the circulation loop having some means for removing the heat transferred to the heat transfer gas from the hot char. In one embodiment, two distillation ovens are operated in off-set, batchwise distillation cycles. The distillation cycles in the two ovens are coordinated so that a fresh charge of rubber feed is introduced into the distillation chamber of one of the ovens as the distillation of rubber in the other oven is concluded. The heat transfer gas is then circulated through both distillation chambers of the two ovens such that heat is transferred from the hot char produced in one oven at the end of a cycle to the heat transfer gas, and then transferred from the gas to the cold rubber feed introduced into the distillation chamber of the other oven at the beginning of a cycle to **preheat** the rubber feed. An effective means for determining the distillation end point and a pressurized distillation oven door seal are also provided.

2. 5,728,361, Mar. 17, 1998, Method for recovering carbon black from composites; Carl A. Holley, 423/449.6, 449.7 [IMAGE AVAILABLE]

US PAT NO: 5,728,361 [IMAGE AVAILABLE] L4: 2 of 17

ABSTRACT:
The invention provides a method and system for continuously recovering carbon black from a plurality of composites where each one of the composites comprises carbon black and polymers. The basic method of the invention comprises a heating step which is conducted in a reactor. In the method, it is necessary to prepare a series of mixtures of the composites, with each one of the series comprising a distribution of carbon black properties substantially similar to the other mixtures of the series. The composites may be fragmentized or comminuted into smaller pieces more suitable for pyrolysis and decomposition reactions in the reactor. In the reactor, the fragmentized mixtures are heated to a temperature sufficient to crack the polymers and to form a vaporizable constituent. The vaporizable constituents are removed from the reactor at first and second outlet ends whereby the amount of time the vaporized constituents are in the reactor is reduced. That is, their residence time is reduced by the method of the invention which includes removal at two ends. The vaporized constituents are then cooled to form condensate fraction and a gaseous fraction. The gaseous fraction is then used for reinjection into the reactor chamber.

3. 5,607,487, Mar. 4, 1997, Bottom feed - updraft gasification system; Leland T. Taylor, 48/111, 76, 86A, 128 [IMAGE AVAILABLE]

US PAT NO: 5,607,487 [IMAGE AVAILABLE] L4: 3 of 17

ABSTRACT:
A gasification system for solid wastes having a thermal reactor and a mechanical gas cleaner, an indirect heat exchange cooler, and an electrostatic precipitator for cleaning and cooling the produced gas. Feed material is continuously fed to he central section of the thermal

reactor above an air introduction manifold and nozzles and in an upward direction, forming a stratified charge. As feed material moves upward and outward from the reactor center it is reduced to ash. An agitator assures contact between the hot particulate product and hot gases resulting in gasification of the feed material and net movement to the sidewall of the thermal reactor, forming ash. The air introduction nozzles serve as a grate. Ash descends along the sidewall to the reactor base for removal. The mechanical cleaner has a high speed rotating brush-like gas separator element and scraper combination which removes condensed tars and particulates from the produced gas stream. The device is self cleaning in that condensed tars and particulates agglomerate on the high speed rotating bristle elements and, upon reaching adequate size and mass, are thrown off by centrifugal force to the cylindrical sidewall, where scrapers remove accumulated material which falls to the separator base for removal. An electrostatic precipitator having a cylindrical brush-like electrode suspended from one end by an insulated arm, removes remaining particles or aerosols from the product gas.

4. 5,343,699, Sep. 6, 1994, Method and apparatus for improved operation of internal combustion engines; Roy E. McAlister, 60/273, 309; 123/1A, 3, 151, 169V, 348, 430, 527 [IMAGE AVAILABLE]

US PAT NO: 5,343,699 [IMAGE AVAILABLE] L4: 4 of 17

ABSTRACT:
A process for operating an internal combustion heat engine which comprises the steps of thermochemically regenerating waste heat rejected by the heat engine by reacting at least one conventional fuel compound containing hydrogen and carbon with an oxygen donor using substantial quantities of the waste heat to produce a mixture of engine-fuel containing substantial quantities of hydrogen and carbon monoxide and utilizing the mixture of engine-fuel to operate an internal combustion engine.

5. 5,330,623, Jul. 19, 1994, Process of **destructive distillation** of organic material; Kenneth M. Holland, 201/19, 25, 29, 32, 35; 423/449.1; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,330,623 [IMAGE AVAILABLE] L4: 5 of 17

ABSTRACT:
The organic material (such as waste **tire** compound) is pyrolysed by pre-heating the organic material (without pyrolysis) in a **preheat** zone 9 by a hot gas stream; feeding pre-heated material directly to a microwave discharge zone 10 by means of conveyor 8; pyrolysing the pre-heated material in the microwave discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

6. 5,286,374, Feb. 15, 1994, Process for cracking waste rubber **tires**; Huang-Chuan Chen, 208/400; 44/628; 201/25; 208/118, 122, 419; 241/17, DIG.31; 502/213, 242, 263 [IMAGE AVAILABLE]

US PAT NO: 5,286,374 [IMAGE AVAILABLE] L4: 6 of 17

ABSTRACT:
An economic and safe process includes a catalytic cracking of the rubber **tires** and rubber products in the presence of mica catalyst selected from muscovite, sericite and biotite at a reaction temperature of 230.degree.-400.degree. C. under a pressure of 1-2.5 atmospheres for forming mixed oils, carbon black, gaseous products, and other residual products.

7. 5,084,141, Jan. 28, 1992, Process of **destructive distillation** of organic material; Kenneth M. Holland, 201/19, 25, 29, 32, 35;

423/449.1; 585/241 [IMAGE AVAILABLE]

US PAT NO: 5,084,141 [IMAGE AVAILABLE] L4: 7 of 17

ABSTRACT:

The organic material (such as waste **tire** compound) is pyrolyzed by pre-heating the organic material (without pyrolysis) in a **preheat** zone 9 by a hot gas stream; feeding pre-heated material directly to a microwave discharge zone 10 by means of conveyor 8; pyrolyzing the pre-heated material in the microwave discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

8. 4,648,328, Mar. 10, 1987, Apparatus and process for the pyrolysis of **tires**; William R. Keough, 110/229, 242, 346; 201/25; 202/117 [IMAGE AVAILABLE]

US PAT NO: 4,648,328 [IMAGE AVAILABLE] L4: 8 of 17

ABSTRACT:
This invention relates to an apparatus and process for the pyrolysis of used vehicular **tires**. The apparatus includes a reaction chamber supported internally of an insulated casing and heated by heating means interposed between the chamber and the casing. **Tire** fragments are introduced into and removed from the reaction chamber through airlock mechanisms to prevent the ingress of ambient air as the fragments are conveyed through the chamber by a chain and flight conveyor scraping any accumulated solids from the chamber and the conveyor. All portions of the apparatus contacting the pyrolysis reaction products are clad with a layer of aluminum oxide to prevent corrosion. The process includes shredding the used **tires**, **preheating** the **tire** fragments if desired, passing the fragments through the reaction chamber, separating solid and gaseous products, recycling a portion of the gaseous product to the heating means, and recoving salable gas, oil and carbon products.

9. 4,588,477, May 13, 1986, Traveling fluidized bed distillation of scrap **tires** and rubber vulcanizate; Ikram W. Habib, 201/25; 75/656; 201/31, 44; 585/241 [IMAGE AVAILABLE]

US PAT NO: 4,588,477 [IMAGE AVAILABLE] L4: 9 of 17

ABSTRACT:
Method for traveling fluidized bed distillation of coarse ground **tire** scrap, rubber vulcanizate (also vulcanized rubber), in a mixture with coarse aggregate. The rubber and aggregates are charges to a vertical still equipped with power burners near the bottom to burn a portion of the carbonaceous residue and supply the needed heat for the distillation process. The volatile materials and the pyrolysis oil vapors are drawn at the top for recovery and processing. Fines are recovered and the aggregate still at elevated temperatures are recycled to the top of the column and reused again with additional ground rubber. Noncondensable gases resulting from the "pyrolysis oil" condensation and recovery system contain high heating value and can be used for combustion needs in the still, or for steam generation. Therefore, this invention makes use of the different components of the distillation process by selecting the gases and the carbonaceous components for combustion and heating needs to generate the pyrolysis oils in high yield. Another use of this invention is the production of zinc, as a result of the reducing atmosphere and high temperature present below the combustion zone.

10. 4,563,246, Jan. 7, 1986, Apparatus for retorting particulate solids having recoverable volatile constituents; Leland M. Reed, et al., 202/100; 201/33; 202/117, 136, 216, 218; 422/209; 432/106, 118 [IMAGE AVAILABLE]

US PAT NO: 4,563,246 [IMAGE AVAILABLE] L4: 10 of 17

ABSTRACT:
A method and apparatus is disclosed for retorting particulate solid materials, particularly hydrocarbon-containing materials such as oil shale, oil sands, tar sands, coal shale, coal tailings, and the like, for the recovery of a volatile constituent such as oil or gas. A rotary retorting apparatus is employed which consists of a cylindrical drum, or other similar regularly shaped chamber, with a substantially horizontal axis of rotation and having multiple compartments for retorting and combustion and, optionally, spent solids cooling. The apparatus further includes solids transport chutes for forward and backward circulation of solids, arranged for the intercompartmental transfer of solids with the capability of additions at one or more points in each compartment. Employing the method and apparatus, particulate solids feedstock is heated by recycled spent solids material to remove the volatile constituent of the feedstock in the retort section. Another feature of the invention employs direct solids-to-gas contact established by lifting and cascading reacting solids through hot gas streams such that throughput, high thermal efficiency, low energy input, among other advantages, are obtained in producing high yields of volatile product. In particular, high oil yields and gas yields are obtained when processing oil shale, but with low sulfur oxides, nitrogen oxides in the flue gases and reduced hydrogen sulfide in the retort gases.

11. 4,477,331, Oct. 16, 1984, Method for retorting particulate solids having recoverable volatile constituents in a rotating horizontal chamber; Leland M. Reed, et al., 208/411; 201/16; 208/427 [IMAGE AVAILABLE]

US PAT NO: 4,477,331 [IMAGE AVAILABLE] L4: 11 of 17

ABSTRACT:
A method and apparatus is disclosed for retorting particulate solid materials, particularly hydrocarbon-containing materials such as oil shale, oil sands, tar sands, coal shale, coal tailings, and the like, for the recovery of a volatile constituent such as oil or gas. A rotary retorting apparatus is employed which consists of a cylindrical drum, or other similar regularly shaped chamber, with a substantially horizontal axis of rotation and having multiple compartments for retorting and combustion and, optionally, spent solids cooling. The apparatus further includes solids transport chutes for forward and backward circulation of solids, arranged for the intercompartmental transfer of solids with the capability of additions at one or more points in each compartment. Employing the method and apparatus, particulate solids feedstock is heated by recycled spent solids material to remove the volatile constituent of the feedstock in the retort section. Another feature of the invention employs direct solids-to-gas contact established by lifting and cascading reacting solids through hot gas streams such that throughput, high thermal efficiency, low energy input, among other advantages, are obtained in producing high yields of volatile product. In particular, high oil yields and gas yields are obtained when processing oil shale, but with low sulfur oxides, nitrogen oxides in the flue gases and reduced hydrogen sulfide in the retort gases.

12. 4,308,103, Dec. 29, 1981, Apparatus for the pyrolysis of comminuted solid carbonizable materials; Franz Rotter, 202/117; 48/111; 201/25, 33; 202/135, 137, 265 [IMAGE AVAILABLE]

US PAT NO: 4,308,103 [IMAGE AVAILABLE] L4: 12 of 17

ABSTRACT:
Apparatus for effecting the pyrolytic treatment of solid carbonizable materials, such as coal, shredded scrap-**tires**, comminuted municipal waste, sawdust and wood shavings, and the like. The treatment takes place

in a cylindrical, horizontally-disposed reactor vessel including a material conveying device which transports the carbonizable materials through the vessel as a moving bed. A heating chamber is arranged coaxially around the reactor vessel and is configured as an annulus of substantially uniform inner diameter and of decreasing outer dimension from its forward end adjacent the materials outlet end of the reaction vessel, to its rearward end, adjacent the materials inlet end of such vessel. The material passing through the reaction vessel is subject to an indirect heat transfer relationship with a burning air-fuel mixture spirally swirling within the heating chamber and moving in a direction generally counter-current to the material passing through the reaction vessel. The burning air-fuel mixture and combusted gases are progressively constricted and confined by the heating chamber configuration and leave the heating chamber via an exhaust gas exit conduit located at a low point in the heating zone. During its passage through the reaction zone the material to be carbonized is converted by pyrolysis, or high-temperature **destructive distillation**, into combustible gases, liquid hydrocarbons and solid carbonaceous residues.

13. 4,123,332, Oct. 31, 1978, Process and apparatus for carbonizing a comminuted solid carbonizable material; Franz Rotter, 201/15, 25, 27, 33; 202/117, 137; 432/20, 113 [IMAGE AVAILABLE]

US PAT NO: 4,123,332 [IMAGE AVAILABLE] L4: 13 of 17

ABSTRACT:
Process and apparatus for treating a comminuted solid carbonizable material, such as comminuted municipal waste; sawdust, granulated coal, shredded **tires** and the like wherein the material is caused to be pyrolyzed in a horizontally disposed elongated reaction zone essentially free of any oxygen containing gases at ambient pressure and at a temperature of from 400.degree. C. to 900.degree. C. The material is passed through the reaction zone by paddle-like impellers mounted on a shaft while being subject to an indirect heat transfer relationship via a burning air fuel mixture spirally swirling within a heating zone about the reaction zone and the mixture being withdrawn from a lower portion of the heating zone. During pyrolysis, the material is chemically changed into valuable gaseous, liquid and solid products.

14. 4,118,281, Oct. 3, 1978, Conversion of solid wastes to fuel coke and gasoline/light oil; Tsoung-Yuan Yan, 201/2.5; 48/209; 201/23, 25; 208/13, 85, 113, 131, 434; 521/40, 40.5, 44.5, 45.5, 46.5, 47, 49 [IMAGE AVAILABLE]

US PAT NO: 4,118,281 [IMAGE AVAILABLE] L4: 14 of 17

ABSTRACT:
Solid organic wastes are slurried with hot coker recycle feed or fresh petroleum feedstocks at temperatures within the range from about 300.degree. to 1000.degree. F and the resulting mixture is coked to produce gas, oil, and coke. The oil can be used as clean liquid fuel, but preferably it is used as catalytic craker feed since it is a particularly suitable cracking stock and produces high yields of gasoline. This process affords a low-cost waste disposal method by a process compatible with current petroleum refining technology.

15. 4,038,152, Jul. 26, 1977, Process and apparatus for the **destructive distillation** of waste material; Lyle D. Atkins, 201/2.5; 34/178, 216, 650; 48/111, 209; 196/98; 201/25, 27, 28, 29, 30, 44; 202/117, 128, 138; 208/102 [IMAGE AVAILABLE]

US PAT NO: 4,038,152 [IMAGE AVAILABLE] L4: 15 of 17

ABSTRACT:
An apparatus is provided for the **destructive distillation** of organic waste materials. An insulated sealed distillator compartment is

provided having a plurality of conveyor stages for transporting the waste material through the sealed compartment while subjecting the material to a plurality of increased zones of temperature in order to completely pyrolyze the material and evolve pyrolysis gases. An auger feed apparatus supplys a continuous supply of material to the sealed distillator, while an auger discharge apparatus removes a continuous supply of solid carbonaceous residue from the distillator. The residue can be classified and separated into usable products. The evolved gases may be converted into crude oil and natural gas. A process for **destructive distillation** of the waste materials is also disclosed.

16. 3,841,851, Oct. 15, 1974, PROCESS AND APPARATUS FOR THE GASIFICATION OF ORGANIC MATTER; Elmer Robert Kaiser, 48/111, 202, 206, 209; 110/220, 222, 224, 255, 259 [IMAGE AVAILABLE]

US PAT NO: 3,841,851 [IMAGE AVAILABLE] L4: 16 of 17

ABSTRACT:
A process for converting solid fuels, particularly the organic matter of solid waste alone or supplemented by solid or liquid fuels, into combustible gases by thermal decomposition with gaseous oxygen. An oxygen-containing gas, particularly gaseous oxygen with or without minor amounts of other gases, such as nitrogen, argon, and steam, is directed into an ignited fuel bed in a manner that will convert the organic matter into a gas and will cause the inorganic matter to melt and will form a central cavity in the fuel bed. The molten inorganic matter is removed from the process in solid form, principally granulated. The gases and vapors are heated in a second chamber to continue the chemical reactions for improving the gas and for decreasing the amount of ungasified matter. The product gases may be used raw for the firing of nearby furnaces, or may be cleaned of undesirable components by conventional means, such as scrubbing, condensation, desulfurization, etc.
The process has the dual function of (1) converting low-grade waste and fuel into a gas having utility as a clean fuel and as a synthesis gas, and (2) disposing of solid wastes and waste oils. The process will assist in meeting the energy crisis by utilizing domestic resources of organic matter and converting them into a gas that will supplement available fuel gas.

17. 3,707,129, Dec. 26, 1972, METHOD AND APPARATUS FOR DISPOSING OF REFUSE; Kensuke Kawashimo, et al., 110/228, 246 [IMAGE AVAILABLE]

US PAT NO: 3,707,129 [IMAGE AVAILABLE] L4: 17 of 17

ABSTRACT:
An apparatus for disposal of refuse consists of three sections arranged in vertical sequence and communicating by means of ports which permit refuse to pass from the top chamber to the bottom chamber. The refuse is dried in the top chamber, gasified in the middle chamber and burned in the bottom chamber. Exhaust gases from the bottom chamber, in part, pass upwardly through downwardly moving refuse to effect gasification in the middle chamber and drying in the top chamber. Exhaust gases from the top chamber are treated to remove noxious and corrosive components prior to recycling to the apparatus and to venting. The method and apparatus are suitable for use with mixed refuse containing among other components, glass, metal and garbage.

```
=> d his

     (FILE 'USPAT' ENTERED AT 16:10:32 ON 31 JUL 1998)
L1             52 S DESTRUCTIVE DISTIL? AND TIRE#
L2         276738 S MICROWAVE OR IRRADIAT? OR RADIAT?
L3             13 S L1 AND L2
L4             17 S L1 AND PREHEAT?
```

```
=> file epo

FILE 'EPO' ENTERED AT 16:13:30 ON 31 JUL 1998

  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
  *                        G P I                                  *
  *    E U R O P E A N   P A T E N T   A B S T R A C T S          *
  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *


=> s l3

          2009 DESTRUCTIVE
          8805 DISTIL?
            32 DESTRUCTIVE DISTIL?
                 (DESTRUCTIVE(W)DISTIL?)
          9914 TIRE#
         10479 MICROWAVE
         11057 IRRADIAT?
         47395 RADIAT?
L5           1 L1 AND L2

=> d ab


US005330623A                                         L5: 1 of 1


ABSTRACT:
```

The organic material (such as waste **tire** compound) is pyrolysed by pre-heating the organic material (without pyrolysis) in a preheat zone 9 by a hot gas stream; feeding pre-heated material directly to a **microwave** discharge zone 10 by means of conveyor 8; pyrolysing the pre-heated material in the **microwave** discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.

```
=> s l4

          2009 DESTRUCTIVE
          8805 DISTIL?
            32 DESTRUCTIVE DISTIL?
                 (DESTRUCTIVE(W)DISTIL?)
          9914 TIRE#
          6508 PREHEAT?
L6           1 L1 AND PREHEAT?

=> d ab


US005330623A                                         L6: 1 of 1


ABSTRACT:
```

The organic material (such as waste **tire** compound) is pyrolysed by pre-heating the organic material (without pyrolysis) in a **preheat** zone 9 by a hot gas stream; feeding pre-heated material directly to a microwave discharge zone 10 by means of conveyor 8; pyrolysing the pre-heated material in the microwave discharge zone to produce solid fission products containing elemental carbon and gaseous by-products; and recycling at least some of the latter to the hot gas stream which is supplied to the pre-heating zone.